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Lubrication

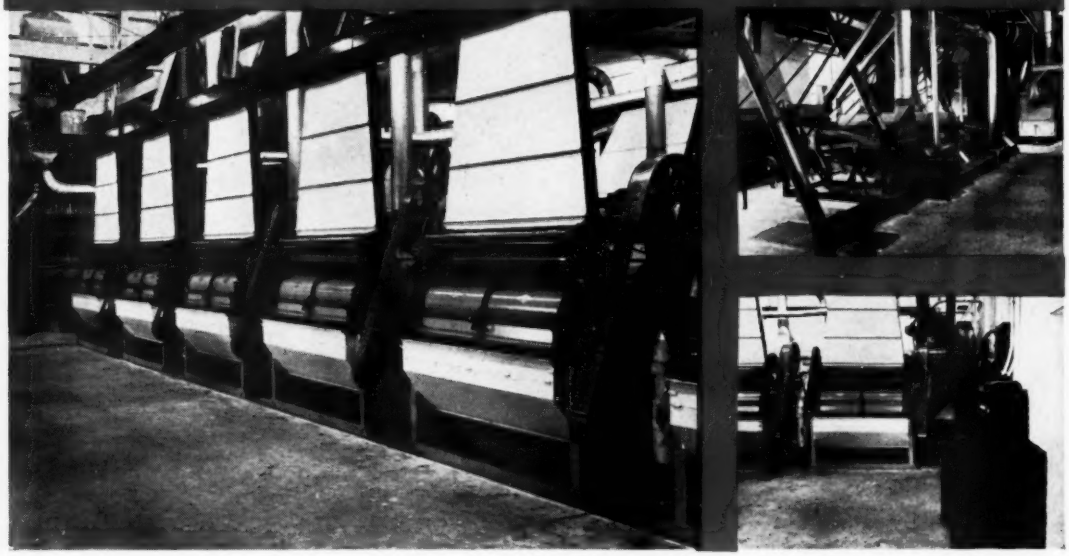
A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Lubrication of
Oil Mill Machinery

PUBLISHED BY
THE TEXAS COMPANY
TEXACO PETROLEUM PRODUCTS

Putting Cotton Seed *thru the Mill!*



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LUBRICATION

A TECHNICAL PUBLICATION DEVOTED TO THE SELECTION AND USE OF LUBRICANTS

Published by
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Vol. XXX September, 1944 No. 9

Change of Address: In reporting change of address kindly give both old and new addresses.

Lubrication of Oil Mill Machinery

WHEN man first learned the art of frying foods, we expect that he used heated stones. All this was probably before the age of metals and the frying pan was far in the future. Then came the age of iron, and as civilization progressed, the development of cooking utensils and the extension of the culinary art.

Quite naturally the housewife in those days used animal fats. They were available in the form of bear grease, tallow and lard and served a multitude of purposes.

Vegetable fats and oils, however, began to share a place with animal fats for cooking when the age of mechanics led to the design of machinery for extracting the oil from such products as the cottonseed, peanut, flaxseed and soybean, etc. Then the production of vegetable oils in the United States became an industry. The by-product—meal—is put to equally good usage as stock feed for livestock, poultry, etc.

In addition to the food value, peanut and cottonseed oil have been found to possess other qualities which are applicable to compounding with petroleum oils and greases in the manufacture of lubricants; cottonseed oil can be used as a base for making alcohol; soy bean oil is used as one of the ingredients in some soaps and paints, and as a core oil in metal moulding. Most recently soy bean oil has been developed as a source of lecethin, a valuable additive used to improve the stability of petroleum products; linseed oil (the product of flaxseed) is used in paint manufacture; and peanut oil is becoming a source of certain of the fats used in grease manufacture. And now the chemist has given us a replacement for tung-oil—so necessary in the manufacture of quick-drying paints and varnishes—in the form of dehydrated castor oil, and isomerized linseed and soy bean oils. As we have untold acreage which can be used for flaxseed and soybeans, our dependence upon imported tung oil may soon be a thing of the past. The by-products of cottonseed also are valuable. Cottonseed linters furnishes cellulose for explosives and high-tenacity rayon for heavy-duty tires; cottonseed hulls are used as a source of Furfural,* and livestock.

CONTAMINATION!
HEAT!

Lubrication of oil mill machinery can be seriously affected by contamination and heat. Hence the need for careful choice of lubricants which will be most desirable under these conditions.

Realizing the fact that designing to prevent contamination of lubricants is a boone to mill operators, the builders of oil mill machinery are to be complimented upon their use of sealed bearings; their study of oil tight chain and gear housings; their provision for automatic or circulated lubrication.

The Petroleum Industry in turn, insures against the adverse effects of high temperature by providing lubricating oils and greases of suitable body to resist the viscosity-reducing effects of heat; along with maximum stability to withstand the effects of oxidation.

* See Hullers page 87.

EXTRACTION PROCEDURES

Vegetable oils and fats are obtained by extracting the oils from the seeds by pressure in an hydraulic or screw type press; or, by use of solvents. The former are mechanical processes and require machinery which presents certain definite lubrication problems. In solvent extraction the process requires apparatus which is designed to handle the meal and recover fluids, chiefly conveying units and pumps.

Pressing

Seed fats are pressed from the meal in an open, closed or continuous machine. To obtain maximum yield the meal is cooked or conditioned before pressing. This breaks up the oil cells and coagulates the albumens; heat also reduces the viscosity so that the oil flows more freely.

Hydraulic power is used for certain types of press operation. Another design utilizes the compression power developed by a rotating worm or screw. Considerable pressure is required, meaning that the equipment must be massive and designed for heavy duty.

Pressure extraction of seed oils is most widely used in the United States where the oil content of cotton and soy bean seeds, for example, is high and where there is a good market for the press cake as livestock and poultry feed.

Solvent Processing

Solvent processing and solvent dewaxing as originally developed for the refining of petroleum oils, are applicable to cottonseed, peanut and soy bean oils, though solvents as a rule are most economically applicable to seeds of lower oil content and where the moisture content is low. In general, solvent processing produces products of excellent edible qualities. Fatty constituents are also produced which can be used successfully in lubricating grease manufacture.

SEED CONVEYORS

Moving the seed from the unloading platform through the seed house to the linters and other cleaning machinery, prior to its treatment in the pressing or oil recovery part of an oil mill, requires an extensive conveyor system.

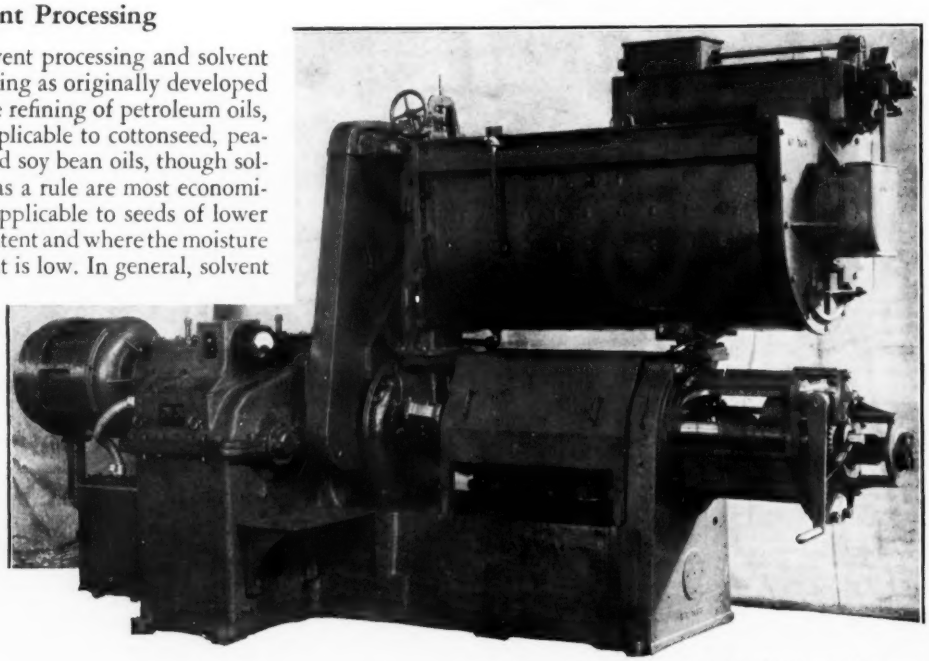
Belt-type conveyors are widely used, the belts moving over conventional guide and idler rolls. They may be located above or below the machinery according to the mill layout.

Rotor lifts and screw conveyors are also popular. These are usually equipped with ball bearing right angle drives, the gears being housed to enable protective lubrication.

Conveyors which deliver seed to the bins or seed house, and carry the seed discharged from the linters (in the cotton oil mill) are located below the floor level. Overhead conveyors, rotor lifts and bucket elevators carry seed from the seed house to the cleaners, cotton-seed linters and pressing machines.

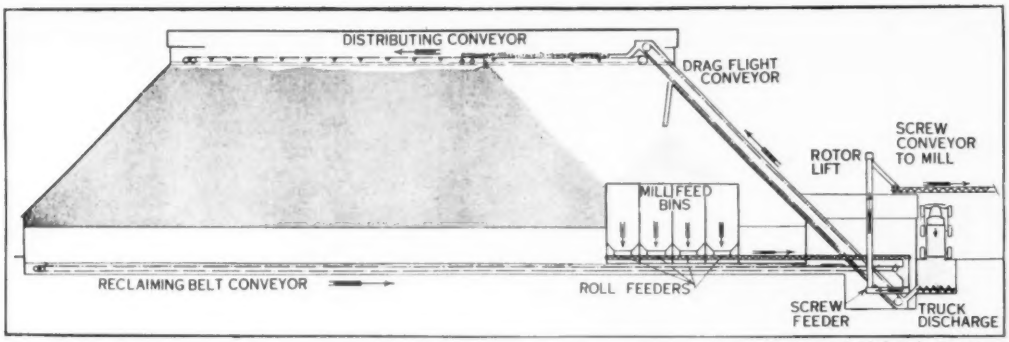
Maintenance Costs Depend on Lubrication

Maintenance of a belt conveyor system requires consideration of both the belting and roll bearings.



Courtesy of The French Oil Mill Machinery Company

Fig. 1—Side view of a French Mechanical Screw Press. See Fig. 14 for details of gears. All gear shafts are carried on anti-friction bearings.



Courtesy of Link-Belt Company

Fig. 2—Showing a Link-Belt conveyor system applied to cottonseed handling.

If the latter are allowed to run dry and wear through lack of lubrication, or if dirt clogs any one of the bearings, the roll may turn with difficulty or even stop. This means that the belt will slide over this particular roll and wear rapidly.

The cost of conveyor maintenance can be controlled by suitable lubrication of the roll bearings. In a well-designed conveyor system these bearings usually will be of ball or roller type, with pressure grease gun fittings for re-lubrication.

The bearing housings should be sufficiently tight to prevent entry of dirt or leakage of grease. The chief difficulty is to get the mill workers to lubricate them all especially in the seed house where they may become covered with seed. Any bearing which requires re-lubrication and is allowed to run long enough without it becomes a potential source of trouble and a possible candidate for replacement.

MILL MOTORS

Oil mill motors should be equipped with bearings which are relatively dust-tight and leak-proof. The motors themselves should be spark-proof. This reduces the fire hazard which could become very serious should arcing occur to cause the seed dust to flash around the cleaners, linters or beaters. Any method of reducing the dust-count in the air is good insurance against fire—for example, using treated seed to prevent lint, fly or dust.

GEARS AND CHAIN DRIVES

A variety of gears and chain drives are found in the average oil mill. Practically all the chains are exposed, as are most of the gears, with the exception of the main and feeder gears in the screw press, and the unit drives installed on certain other machinery such as the screw and rotor conveyors.

Exposed gears and chains usually are run dry, without lubrication; some mill men feel that when they are lubricated, seed dust or lint will ball-up with the gear lubricant. This can become so serious as to throw a linter chain off its sprocket or to cause misalignments and bearing failure on certain gear shafts.

There is just enough oiliness to seed dust or lint to give some lubrication whenever this comes in contact with a gear or chain. Apparently this is enough to keep these parts running satisfactorily, so that the cost of maintenance will not be affected adversely.

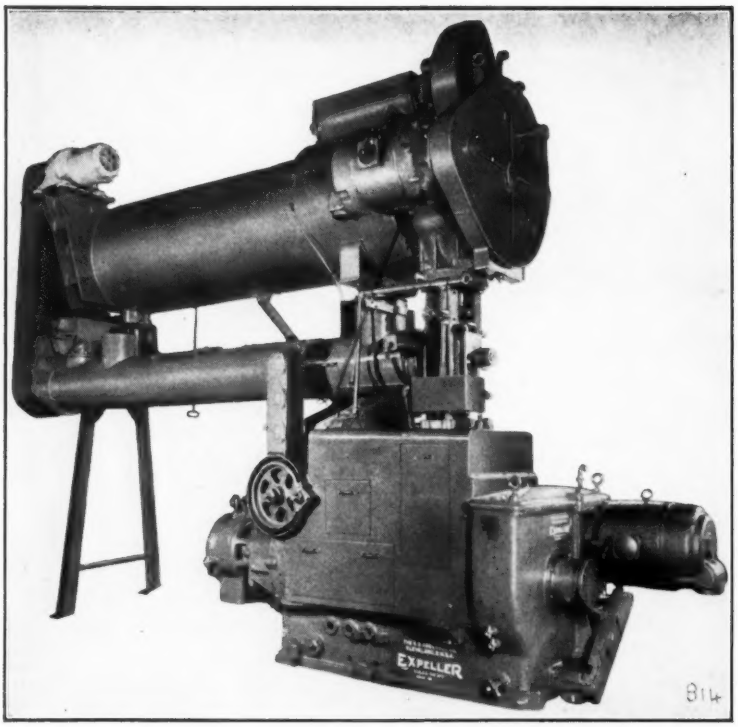
Enclosed Gearing

Any enclosed gear set, however, should be carefully lubricated with a suitable petroleum base-product. Normally a gear lubricant within the viscosity range assigned to steam cylinder oils will be suitable, according to the probable maximum gear case temperatures.

Contamination should be watched, because any

Courtesy of Link-Belt Company

Fig. 3—A distributing belt conveyor handling seed. Note the movable discharge plow.



Courtesy of The V. D. Anderson Company

Fig. 4—The Anderson Twin-Motor Super Duo Expeller with cooker. Note construction is planned to prevent contamination of seed oil with lubricating oil and vice versa. Fig. 16 shows the gear box open for lubrication.

appreciable quantity of vegetable oil mixed with petroleum base gear lubricants may cause undesirable sludge and gum accumulations. Certain builders advise check analysis of the gear case oil every six months and filtration of gear case oils through suitable filters once a month.

The use of effective seals when the gear shafts protrude through the cases helps to prevent entry of the vegetable oil being handled. By observing a proper cleaning procedure around the mill and preventing build-up of dirt and meal around the gear shafts, the chance of leakage of the seed oil into gear cases will be reduced. In other words, "good housekeeping" is beneficial. Entrance of mineral oil into cottonseed oil or meats also can be very serious, as this gives a bloom to the edible oil which is very objectionable.

Oil Treated Cotton Seed

In cotton oil mills, the objective is to press out or extract the maximum amount of oil from the seed, and to recover the maximum amount of lint and hulls. The latter are byproducts, but very valuable byproducts. The lint is a vital source of cellulose, a component of explosives. The hulls are a source of Furfural.

One of the latest advancements in linting involves treating or coating the cotton seed with a very light film of very low viscosity, specially compounded petroleum oil as the seed passes over the conveyors on the way to the linters.

The indicated benefits which result from such treatments include:

(a) Reduced dust and fly at the lint discharge.

(b) Reduce static and fire hazard.

(c) Greater lint recovery.

(d) Prevention of saw clogging.

SCREENING

Screening is an important process in any vegetable oil mill. Cottonseed in some areas comes to the mill from the gin in rather dirty condition. It may be mixed or tangled with small bits of stick and some dirt. In the seed house this waste material is removed by running the seed over single or double shaker screens after the seed has passed the boll and sand reels and before the seed is conveyed to the linters. Shaker screens are much the same throughout the mill involving tilted screen frames which are vibrated by an eccentric. Waste material is removed by air blast.

Screen Lubrication

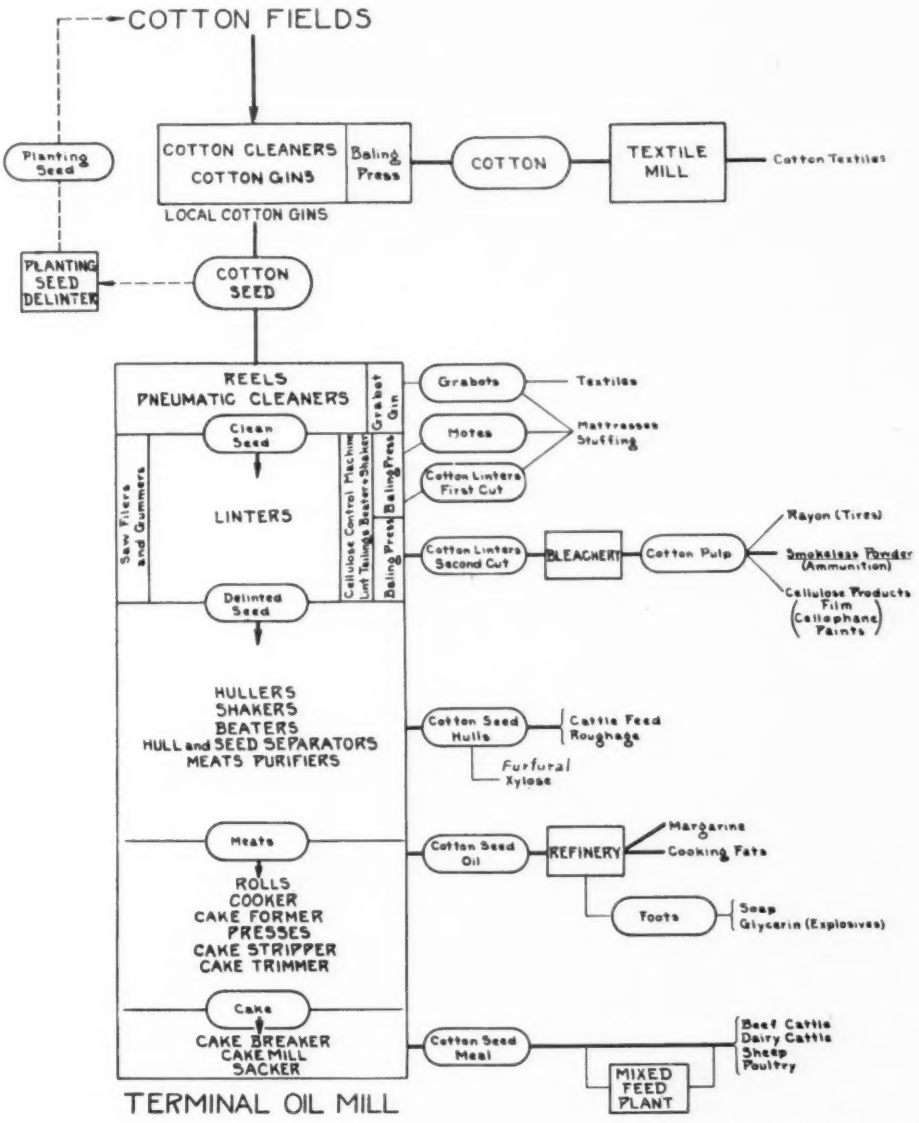
Grease lubrication has been found to be very satisfactory for the anti-friction bearings of vibrating or shaking screens, affording the requisite protection by preventing the entry of dust and dirt. As a rule, some form of compression or pressure grease lubricating device should be used to insure as nearly positive lubrication as possible. A medium bodied grease (see description on page 91) will be suited to such operations. Where desirable, as on certain types of anti-friction bearings a medium viscosity straight mineral machine oil (as described on page 90) is often used.

Eccentrics may also present a problem by running hot involving the possibility of under-lubrication and abnormal wear of cams and straps. Cooling in emergencies must be effected by the best means available. Some use so-called cooling compounds applied by the lubricators; others use air fans.

Lubrication in the meantime is usually maintained by a high melting point grease of relatively heavy consistency. The lubricating film developed by such a grease is decidedly tenacious, resistant to the thinning-out effects of higher temperatures and usually effectual in preventing eccentrics from overheating.

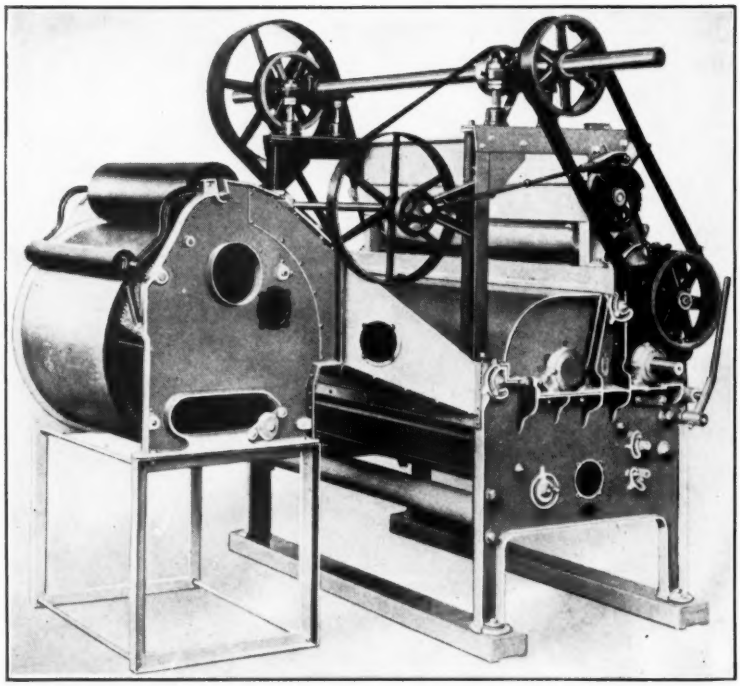
THE COTTON SEED LINTER

Linting—the process of cutting lint from the seed in cotton oil mills is done to recover the lint for military and industrial purposes, and to prepare the seed for crushing and subsequent oil extraction. The seeds are carried from the screens by overhead conveyors and allowed to drop into the linters through the feed hoppers to come in contact with rapidly rotating circular saws set close together on a common cylinder. Linting is done in one or two cuts. When the mill is equipped for making mill run linters only one cut is taken, when designed to take two cuts the first cut takes off the longest fibres of the lint; the second cut is a finishing process and by its effectiveness it influences the lint recovery per ton of seed run. Lint is collected by a condenser or through a lint-flue system.



Courtesy of Carver Cotton Gin Co.

Fig. 5—Flow sheet showing operations and products in a cotton seed oil mill.



Courtesy of Continental Gin Co.

Fig. 6—The Continental All Metal Linter equipped with ball bearings on all movable parts.

Courtesy of Carver Cotton Gin Co.

Fig. 7—A Carver steel frame linter fully equipped with ball bearings, overhead drive and means to protect lubrication.

Saw Condition Important

The condition of the saws in the linter is a most important factor in successful linting. The teeth must be sharp; the clearance between the teeth and the companion slots in the grates must be uniform. The latter depends to a considerable extent upon the alignment and the condition of the end bearings. Excessive bearing wear, due to inadequate lubrication or contaminated lubricants, causing one end of a saw shaft or float to drop or vibrate can cause serious damage to the seed. In turn, wear on the saw teeth which may require too frequent sharpening will increase the cost of maintenance. Saw cylinder end bearings usually are antifriction, with fittings for pressure grease lubrication. Some float bearings are still of the sleeve-type, also provided for pressure gun lubrication. Effective lubrication of these bearings to keep them in free working condition also will reduce the power consumption of the linter.

Saw Speed

The slowest saw speed, all other conditions being considered, produces the best lint quality. On the brush-type linter the lint is removed from the saw teeth by the rapidly rotating brush. Free lint removal is facilitated when oil-treated seed is run. On the brushless linter air draft is relied upon to remove lint from the saw teeth. Both types use air draft to facilitate lint discharge.

Saw speed vary from 400 to 450 RPM in first cut linters; and 600 to 800 in second cut work. The float speed is from 50 to 80% of the saw speed. Brushes in open condenser linters run at from

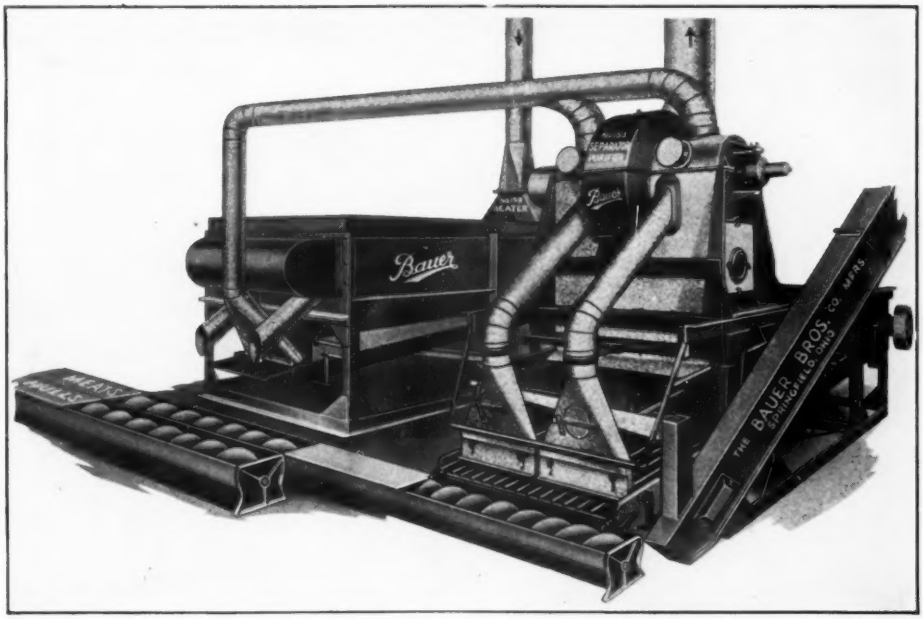


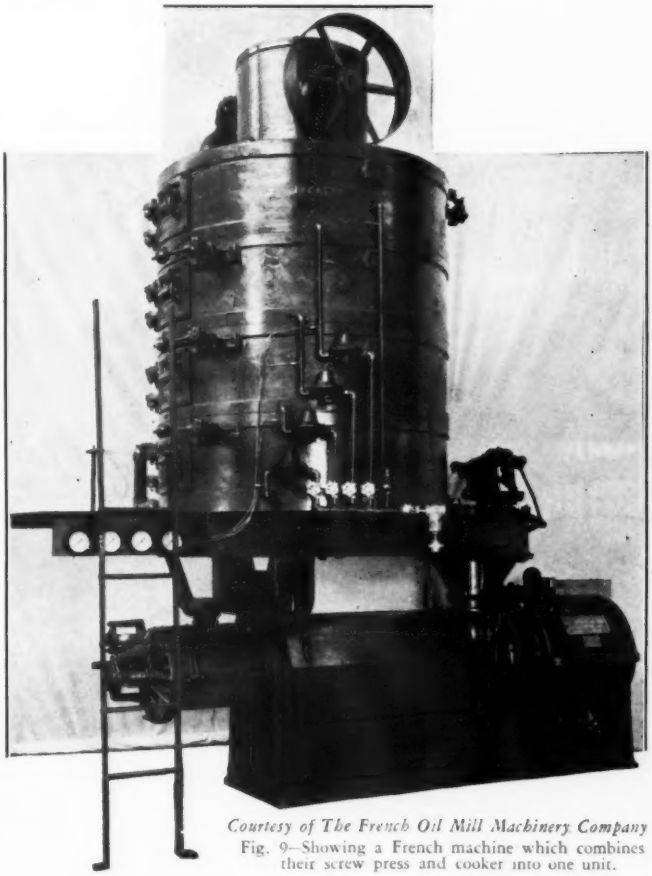
Fig. 8—Details of Bauer Hulling and Separating equipment. *Courtesy of The Bauer Bros. Co.*

1,000 to 1,100 RPM; and in lint-flue machines at from 750 to 850 RPM. All these speed relations must be carefully regulated, to balance the air currents which allow heavy impurities to drop out.

HULLERS

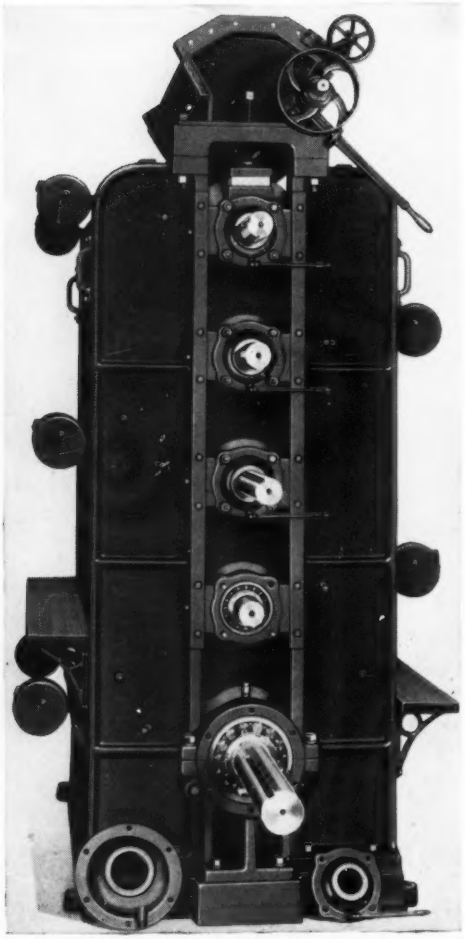
The cottonseed huller has a significant relationship to the petroleum industry. Today cottonseed hulls serve a very useful purpose as one of the base materials for making Furfural — that remarkable solvent which is subsequently used in the refinement of certain vegetable oils for the production of drying oils, and high grade lubricating oils for circulating systems, automotive and aircraft engines.

Delinted seed in the cotton oil mill goes to the huller from the linters, then to the beater and screens. In the soybean mill the huller follows the cleaner. The huller employs rotating and stationary knives which cut the seed coarsely to enable good separation of the meats from the hulls. This separation is done on a shaker screen, the meats dropping to a gathering trough for delivery to the roll crushers. The hulls are collected separately to be put through beaters to recover fine meats.



Courtesy of The French Oil Mill Machinery Company

Fig. 9—Showing a French machine which combines their screw press and cooker into one unit.



Courtesy of Buckeye Iron and Brass Works

Fig. 10—End view of the newly designed Buckeye Crushing Rolls showing the anti-friction bearing mountings, equipped for pressure grease lubrication. The bottom bearings which carry the load are of roller type; the intermediate rolls run on ball bearings.

WHERE HIGH TEMPERATURES OCCUR

High temperatures which may affect the performance of bearing lubricants are present or induced at the roll crushers, cookers, screw presses and pellet mills.

Wherever steam is used for seed conditioning the heat is transmitted to the operating parts of the machines. The temperature may vary all the way 240° to 350° Fahr.

At the Cookers

After crushing, the meal from the cottonseed, peanut, soy bean, etc. is heated preparatory to "hot pressing." Heating is carried out in a "cooker," conditioner or rotary dryer by means of steam heat at a temperature above 212°F. for thirty to ninety minutes. Proper regulation of the moisture content in the cooked meal is important to attain good pressing. In hydraulic press operation best cake moisture is 6 to 8% equal to 4 to 6% in cooked meal. In screw press operation the meal must be dried or cooked down to give a cake moisture of 3 to 4%.

Vertical cookers have an internal paddle or agitator which is turned by a central shaft carried below the cooker in a step bearing, with a guide bearing at the bottom of the cooker. A bevel gear drive above or below the cooker furnishes the power for turning this agitator so that continuous stirring of the seed meats is maintained.

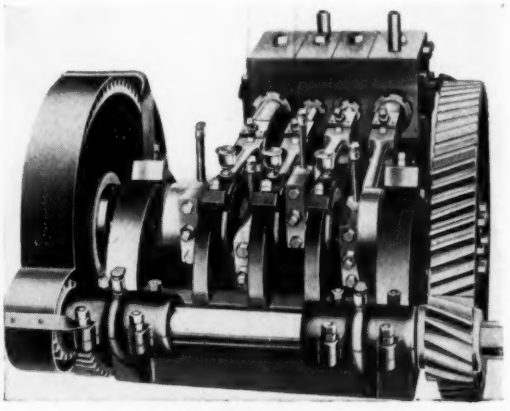
The bearings in question are usually grease lubricated by a specially compounded high temperature grease which contains a heavy-bodied mineral oil which will resist leakage at the operating temperatures. Pressure gun application is usual.

Roll Crushers and Pellet Mills

High temperatures, which may be induced at the bearings by reason of the pressures exerted by the processing machines, are found on the roll crushers, screw presses and pellet mills. The high pressure which may exist presents an additional lubrication problem.

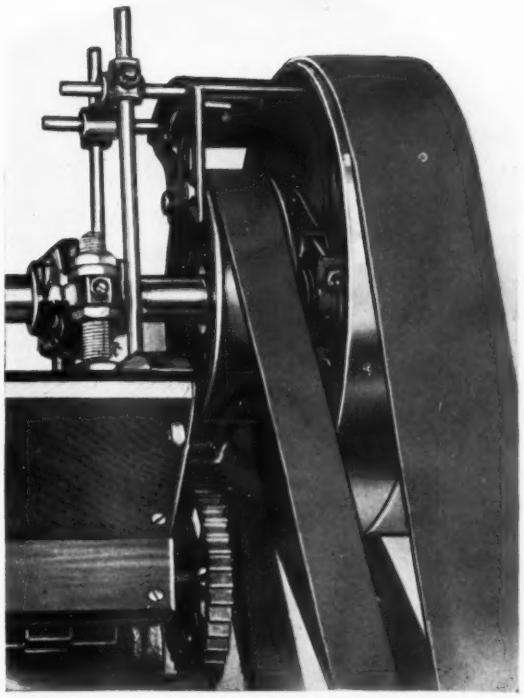
The roll crushers prepare the seed meats for cooking. A roll stand consists of five rolls varying in size from 36" to 60" long and 14 to 24" diameter. Heavy pressures (which carry through to the roll bearings) must be applied to the rolls in order to do a good job of crushing. For this reason the end bearings of the bottom roll are of anti-friction type, carried in specially designed housings to prevent leakage of lubricants. Ball or roller bearings are also justified on the end bearings of the upper rolls, though often these will be carried on plain bearings.

Roll bearings may be either oil or grease lubri-



Courtesy of Buckeye Iron and Brass Works

Fig. 11—Close-up of the five-bearing crankshaft of a Buckeye Hydraulic Pump for press room service. Note provisions for lubrication.



Courtesy of Carver Cotton Gin Co.
Fig. 12—Line shaft bracket equipped with adjustable ball bearings on a Carver Cotton Seed Linter.

cated according to the design of the roll stand. Ball or roller bearings generally have fittings for grease lubrication. They require a special anti-friction bearing grease which will resist oxidation and function under farily high temperatures and pressures. Where oil lubrication is required, a heavy-bodied or fairly high viscosity straight mineral oil is best. The viscosity should be around 750 sec. Saybolt Universal at 100° F.

The pellet mills develop induced temperatures due to friction of the meal as it is forced through the holes in the forming plate. Some 40 to 60 degrees above the room temperature will prevail at this point. Leakage at the seals of pellet mill rolls requires periodic check on the seals; lubricant leakage would lead to dry roll bearings and oil-contaminated meal.

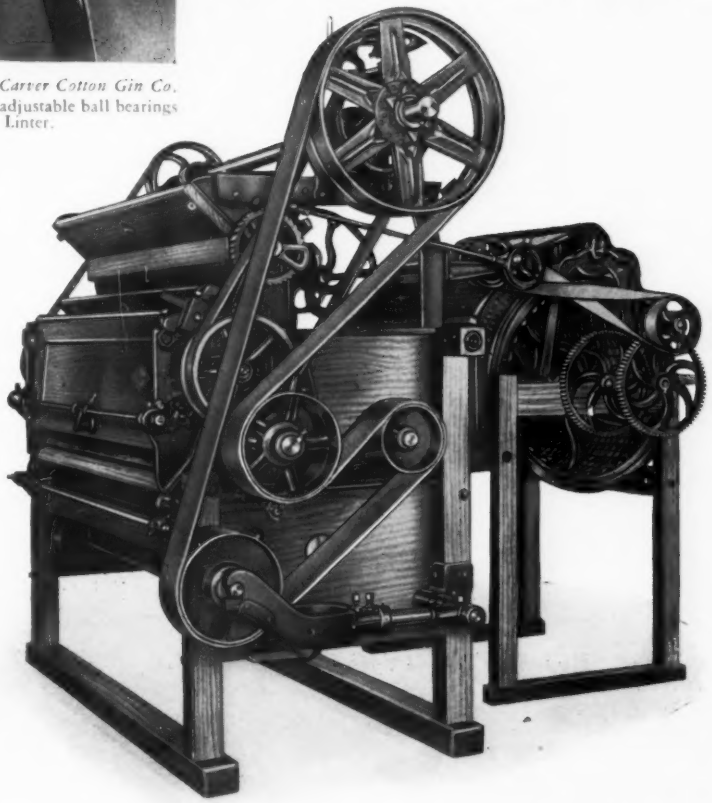
HYDRAULIC PRESSURE

High pressures in the oil mill are encountered where oil is expelled from the meats in hydraulic presses. In conventional hydraulic press mills the meal from the cooker (at a temperature around 225°F.) goes to an hydraulic operated former which presses the meal into a mould wrapped by a retaining cloth of mohair or wool which holds the pressed cake until it goes through the hydraulic press. Here the required pressure is applied for from 20 to 60 minutes, to remove the maximum amount of oil from the cake. As pressure is applied, oil seeps through the press cloth to drain to the settling tank.

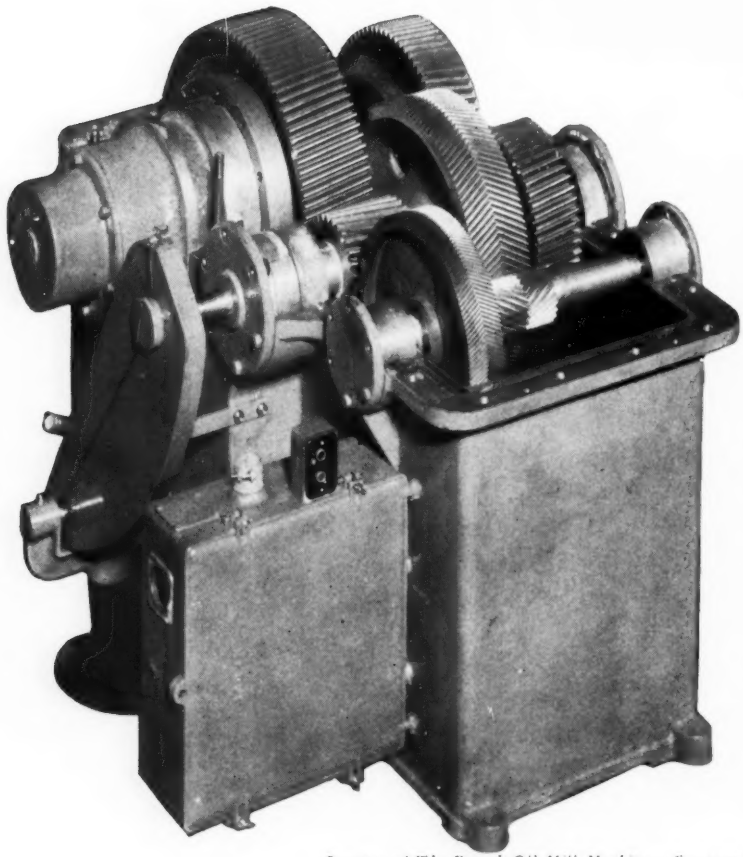
The cake from which oil has been removed, goes from the hydraulic press to the stripper which removes the cloth; then to the trimmer which cuts any ragged edges from the cake. These trimmings are repressed for further oil recovery. The cake goes to the breaker which breaks it into small pieces for meal preparation.

The Hydraulic Oil

To avoid any possibility of petroleum oil contaminating the vegetable oil being expressed, the



Courtesy of Carver Cotton Gin Co.
Fig. 13—The Carver Wooden Frame Linter for cotton seed, showing assembly of the driving mechanisms.



Courtesy of The French Oil Mill Machinery Company

Fig. 14—Herringbone and helical gear assembly on a French Mechanical Screw Press. Tightness of the gear case is important to prevent loss of lubricating oil or entry of product oil. Contamination of either must be prevented as far as possible.

latter is used in the hydraulic system. From the time the seed meats are separated from the hulls, it is important to observe every care to keep the product free from contamination for mineral oil would affect the taste, color and purity of edible oils. Accordingly, from this point on, in the mill, the lubrication procedure should be planned with even more caution. *Never starve a bearing.* On the other hand, *don't over lubricate, and wipe up any leakage* around the presses.

DIRECT PRESSURE

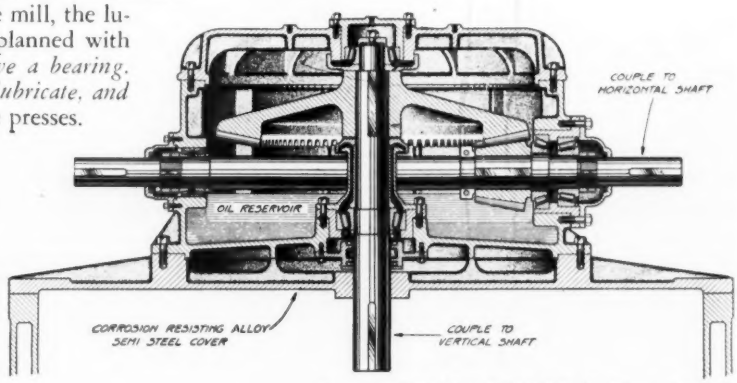
Pressure upon the worm thrust bearings and the choke mechanism in the continuous or screw press becomes reactionary in its effect upon the bearings. As the operation is continuous, however, this effect normally does not become as serious as it would were the machinery subject to the impact shocks of "stop and go" operation.

BEARING LUBRICATION

General purpose machine oil or a good ball or roller bearing grease is the usual specification for oil mill machinery bearings. Neither of these identifications tell us very much. It's like buying a hat without knowing the size. Let's go further.

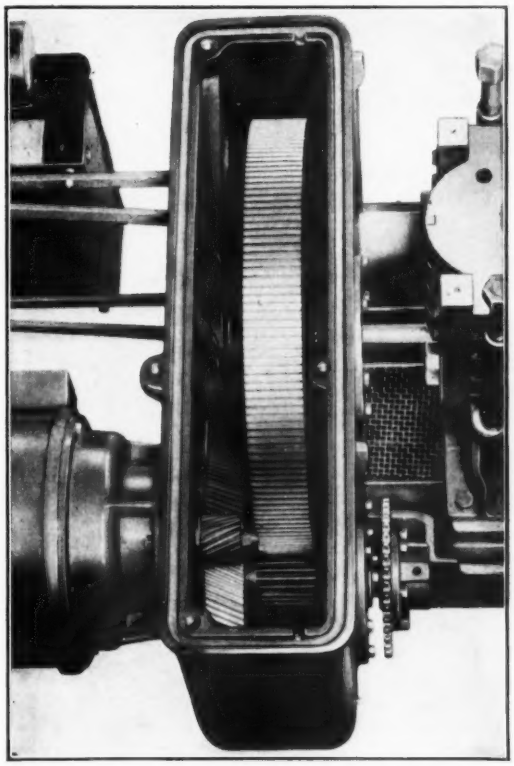
Nature of the Oil

A general purpose machine oil implies a straight mineral oil which has been carefully refined to remove the more volatile hydrocarbons. The finished oil is clear reddish in color, although it can be filtered to lighten the color. But this added refinement makes the oil more costly. Of more concern to the oil mill operator is the body or viscosity of the oil. Machine oils are produced in a number of grades — from relatively fluid (like flushing oil) to extra heavy (like a heavy automobile engine oil). In between there are several grades of varying body or viscosity. For oil-lubricated sleeve bearings, eccentrics and small chains, a light-medium grade of around 300-500 seconds. Saybolt Universal Viscosity at 100° Fahr. is generally recommended.



Courtesy of The French Oil Mill Machinery Company

Fig. 15—Structural details of the "Frenco" enclosed hypoid gear drive for French Company Cookers.



Courtesy of The V. D. Anderson Company

Fig. 16—Gear box and driving mechanism of an Anderson Twin-Motor Expeller. All the gears and bearings run in an oil bath.

What Makes a Good Grease

Grease for ball or roller bearings is usually a specialty product made with the utmost care from materials of very high quality to assure of maximum stability. Grease is a mixture of soap and oil, but not all such mixtures are good for ball or roller bearings. Remember, these mechanisms are precision-built. They have been chosen by the machinery builders to relieve the maintenance burden of the mill management, to make it easier for the operators, to insure more dependable production. But they require the best lubrication to work satisfactorily.

That's why the petroleum industry is so careful in making such greases. Their outstanding features are stability and resistance to oxidation. The use of a very highly refined medium viscosity petroleum oil, along with sodium and calcium soaps which have been made from premium grade fats, enables the grease chemist to compound under the necessary exacting conditions, a product that meets the requirements. The normal consistency should meet the N.L.G.I.* classification grade, No. 2. The operating temperature range of such a grease is conservatively from zero to 220° Fahr. Other advantages include:

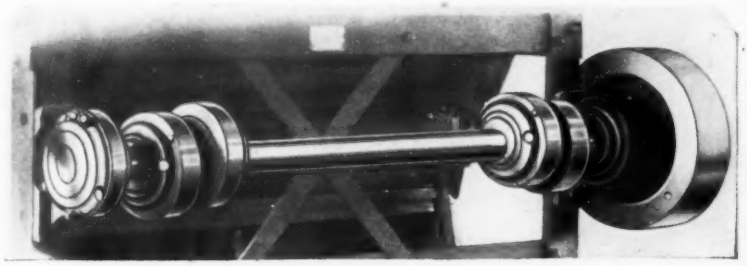
- Easy to handle and easy to apply over the usable temperature range.
- Easy starting characteristics (low torque) at low temperatures, as well as a low running torque.
- Does not liquefy unduly and leak out of bearing under high temperatures or "corkscrew" out of bearings at low temperatures.
- Reduces wear by remaining on the parts being lubricated, i.e., resist being thrown off.
- Maintains low running temperatures.
- Is heat-resistant.
- Is oxidation resistant in both service and storage.

*National Lubricating Grease Institute.

BEARING CLEANING AND FLUSHING PROCEDURE

The frequency of such a procedure normally is governed by the type of bearing and the conditions to which it is exposed. Ring oilers in mill motors automatically flush themselves to settle any foreign matter in the reservoir below the bearing. Wick oilers or methods of periodic lubrication are not so effective; here, when seed dust gets in it stays there until the bearing assembly is flushed and cleaned. The same holds true for the grease-lubricated ball or roller bearing in seed conveyors.

A sealed bearing is protected as to the bearing parts and its charge of lubricant. It is especially important to consider protection of a ball or roller bearing, as churning of abrasive foreign matter with



Courtesy of Carver Cotton Gin Co.

Fig. 17—The main shaker shaft (with ball bearing eccentrics and main journals) on a Carver Shaker Separator.

grease between moving parts which are precision-built to clearances of only a few ten-thousands of an inch will cause serious damage to the bearing elements.

This is why specialty greases should be used for ball and roller bearings. They are prepared from carefully selected and filtered ingredients. They are highly resistant to oxidation, and their lubricating component—the oil, is chosen to give the greatest amount of protection with minimum leakage. Given a good grease and a good bearing seal, relubrication is necessary only about every two or three months. This is a decided advantage where experienced labor is scarce as in many oil mill localities.

Yet it is unwise to set any hard and fast rule as to frequency of re-lubrication due to the variety of service under which motors and conveyors must operate. Dust conditions and the extent of cleanliness of bearings when the mill is down for overhaul should be the guiding factors. Some builders assist in this regard by locating an outlet in the base of each bearing which can be tightly plugged in service. This will prevent leakage during operation and provide means for draining and flushing with oil.

In ring-oil lubricated sleeve-type bearings the oil level in the reservoirs should be measured every two or three weeks. When it is necessary to bring up the oil level add just enough oil. Too much will cause leakage which may get on to motor windings.

How to Clean a Bearing

As it is not always possible to completely seal a bearing or to depend upon the seal being in proper condition at all times, motor and conveyor bearings which may be exposed to an excess of seed dust should be flushed and cleaned at regular intervals.

The frequency of cleaning will depend upon the design of the bearing, the type of seal, the extent to which dust may be present and the nature of the lubricant. Cleaning can be most effectively accomplished by flushing with a light oil (or perhaps the regular bearing oil) which has been heated to around 140 degrees Fahr. Application while the motor is running, with the drain plug removed, will usually remove all grease and foreign matter deposits. Hydrocarbon solvents are not advisable, especially when greases have been used, due to the possibility of non-soluble soap residues remaining within the housing after their oil content has been taken up by the solvent.

Ring oiled bearings often will require more frequent attention than ball or roller bearings, as their housings cannot always be so tightly built. With the former, cleaning may be necessary or advisable at periods ranging from every two weeks to every few months; whereas in normal service a properly sealed ball or roller bearing may go through the entire pressing season unless the operating conditions are especially dirty. The ball or roller bearing, however, is of more delicate construction, consequently its lubricant should not be allowed to become as contaminated as is permissable in a sleeve-type bearing.

Grease lubricated ball or roller bearings should be drained and flushed with oil, or taken down and wiped out thoroughly at the period of cleaning. It is always a good idea to flush with hot oil as explained above. Some bearings can be all the more completely cleared of used grease if the drain plug is removed when new grease is applied.

Ring oiling systems possess natural advantages in that the flood of oil which is constantly passing through the bearings tends to wash out any grit, dirt or dust that may have gained entry. As a result, wear should be negligible just as long as the oil in the system does not become so highly contaminated as to be unable to precipitate such foreign matter during its period of so-called rest. But since this washing action by oil naturally causes a gradual accumulation of foreign matter, the condition of the oil should be checked about every two weeks and the system drained when any excess of dirt becomes apparent.

CONCLUSION

The modern oil mill is a relatively costly investment. Furthermore, very often it is seasonal in that during part of each year it does not operate. Machinery suffers when it is idle. Clean-up procedures of course will prevent this to some extent. Mill machinery is further protected if it is rust-proofed especially those parts which may be vital to operation. For regardless of climate, or cleanliness, some rusting will occur.

Meanwhile the interior surface of the working parts can be protected — both when operating or idle — by adequate lubrication. It is not a costly procedure to lubricate an oil mill properly, but it may become a very costly procedure to maintain the mill if it is not properly lubricated.

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TEXACO LUBRICATION CHART FOR OIL MILL MACHINERY

(COVERING COTTONSEED, LINSEED, SOYBEANS, PEANUTS, ETC.)

CONVEYORS

Bearings	
Sleeve Type—Oiled	Aleph or Altair Oils
—Greased	Regal Starfak No. 2 or Starfak Grease M
Ball or Roller —Greased	Regal Starfak No. 2 or Starfak Grease M

ELECTRIC MOTORS AND BLOWERS

Bearings	
Sleeve Type—Ring Oiled	Alcaid or Aleph Oils
Ball or Roller—Greased	Regal Starfak No. 2 or Starfak Grease M

SPEED REDUCTION GEARS

Enclosed	Thuban-140 or Meropa Lubricant-4
*Exposed	Thuban-250

SHAKERS AND SCREENS

Bearings and Eccentric Straps	Regal Starfak No. 2 or Starfak Grease M

LINTERS

Saw Bearings (Anti-friction)	Regal Starfak No. 2 or Starfak Grease M
Float and End Bearings (Usually Sleeve)	Aleph or Altair Oils
Eccentric—Oiled	Aleph or Altair Oils

BEATERS, HULLERS

Bearings—Pressure Greased	Regal Starfak No. 2 or Starfak Grease M

ROLL CRUSHERS

Bearings	
Bottom Roll—(Usually anti-friction pressure greased)	Regal Starfak No. 2 or Starfak Grease M
Upper Roll—Sleeve Type Oiled	Ursa Oil
Greased	Regal Starfak No. 2 or Starfak Grease M
Ball or Roller—Greased	Regal Starfak No. 2 or Starfak Grease M

*Gears and chains on linters or other machinery exposed to lint or dust are usually run without lubrication.

COOKERS, CONDITIONERS OR DRYERS

Stirring Paddle Shaft Bearings Guide and Thrust	
Oiled	Thuban-140
Greased	Marfak-3
Bevel Drive Gears	Thuban-250
High Temperature Bearings	Marfak-0
Roller Chains and Bearings	Regal Starfak No. 2 or Starfak Grease M

FORMERS, STRIPPERS, TRIMMERS

Lubricated by seed oil

HYDRAULIC PRESSES

Hydraulic oil is the seed oil being extracted

SCREW PRESSES

Choke Mechanism	Marfak-3
Bearings—Pressure Greased	Regal Starfak No. 2 or Starfak Grease M
Gears—Main and Feeder Gear Cases	Thuban-140, or Meropa Lubricant-4

BREAKERS OR ATTRITORS

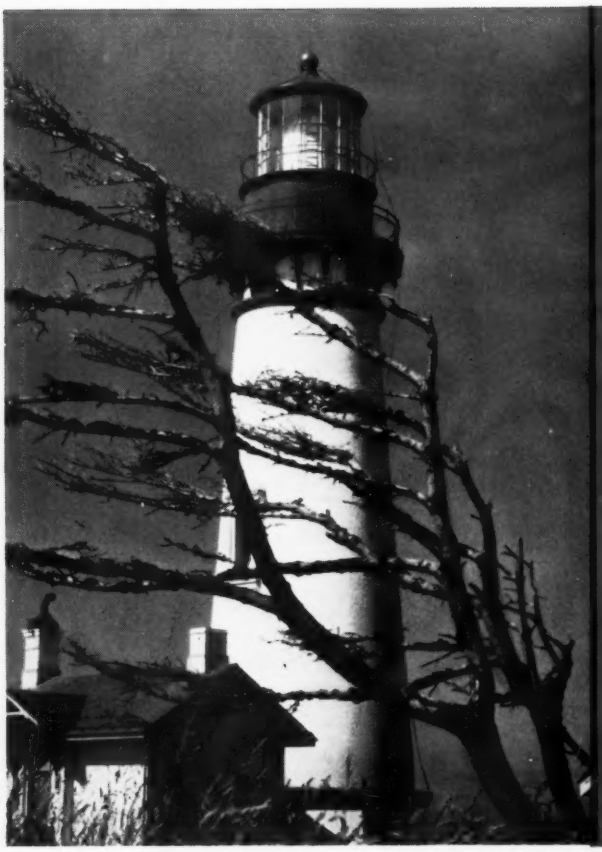
Bearings	
Sleeve Type—Greased	Regal Starfak No. 2 or Starfak Grease M
Ball or Roller—Pressure Greased	Regal Starfak No. 2 or Starfak Grease M
Gears—Enclosed	Meropa Lubricant-4

PELLET MILLS

Gears	Thuban-90
Roller and Thrust Bearings	Thuban-140

POWER PLANT

Steam Cylinders	See Texaco steam cylinder oil recommended according to steam pressure and temperature
Engine Bearings	Aleph Oil
Gas and Diesel Engines (According to Manufacturer's recommendation)	Ursa Oil



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